

$N(1990) 7/2^+$

$$I(J^P) = \frac{1}{2}(7^+) \text{ Status: } **$$

NODE=B017

### OMITTED FROM SUMMARY TABLE

Most of the results published before 1975 are now obsolete and have been omitted. They may be found in our 1982 edition, Physics Letters **111B** 1 (1982). Some further obsolete results published before 1984 were last included in our 2006 edition, Journal of Physics, G **33** 1 (2006).

NODE=B017

The various analyses do not agree very well with one another.

The latest GWU analysis (ARNDT 06) finds no evidence for this resonance.

### $N(1990)$ BREIT-WIGNER MASS

NODE=B017M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>≈ 1990 OUR ESTIMATE</b>			
2060 ± 65	ANISOVICH	12A	DPWA Multichannel
1970 ± 50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2005 ± 150	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
1999	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1990 ± 45	SHRESTHA	12A	DPWA Multichannel
2311 ± 16	VRANA	00	DPWA Multichannel
2086 ± 28	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

 NODE=B017M  
 → UNCHECKED ←

### $N(1990)$ BREIT-WIGNER WIDTH

NODE=B017W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
240 ± 50	ANISOVICH	12A	DPWA Multichannel
350 ± 120	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
350 ± 100	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
216	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
203 ± 161	SHRESTHA	12A	DPWA Multichannel
205 ± 72	VRANA	00	DPWA Multichannel
535 ± 120	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

NODE=B017W

### $N(1990)$ POLE POSITION

NODE=B017215

#### REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2030 ± 65	ANISOVICH	12A	DPWA Multichannel
1900 ± 30	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1941	SHRESTHA	12A	DPWA Multichannel
2301	VRANA	00	DPWA Multichannel
not seen	ARNDT	91	DPWA $\pi N \rightarrow \pi N$ Soln SM90

 NODE=B017RE  
 NODE=B017RE

#### = 2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
240 ± 60	ANISOVICH	12A	DPWA Multichannel
260 ± 60	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
130	SHRESTHA	12A	DPWA Multichannel
202	VRANA	00	DPWA Multichannel
not seen	ARNDT	91	DPWA $\pi N \rightarrow \pi N$ Soln SM90

 NODE=B017IM  
 NODE=B017IM

### $N(1990)$ ELASTIC POLE RESIDUE

NODE=B017220

#### MODULUS |r|

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2 ± 1	ANISOVICH	12A	DPWA Multichannel
9 ± 3	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

 NODE=B017RER  
 NODE=B017RER

**PHASE  $\theta$** 

<u>VALUE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
125 $\pm$ 65	ANISOVICH	12A DPWA	Multichannel
- 60 $\pm$ 30	CUTKOSKY	80 IPWA	$\pi N \rightarrow \pi N$

NODE=B0171MR  
 NODE=B0171MR

**N(1990) DECAY MODES**

NODE=B017225;NODE=B017

<u>Mode</u>	<u>Mode</u>
$\Gamma_1$	$N\pi$
$\Gamma_2$	$N\eta$
$\Gamma_3$	$\Lambda K$
$\Gamma_4$	$\Sigma K$
$\Gamma_5$	$N\pi\pi$
$\Gamma_6$	$p\gamma$ , helicity=1/2
$\Gamma_7$	$p\gamma$ , helicity=3/2
$\Gamma_8$	$n\gamma$ , helicity=1/2
$\Gamma_9$	$n\gamma$ , helicity=3/2

DESIG=1  
 DESIG=2  
 DESIG=3  
 DESIG=4  
 DESIG=5  
 DESIG=6  
 DESIG=7  
 DESIG=8  
 DESIG=9

**N(1990) BRANCHING RATIOS**

NODE=B017230

<u><math>\Gamma(N\pi)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>\Gamma_1/\Gamma</math></u>
2 $\pm$ 1	ANISOVICH	12A DPWA	Multichannel	
6 $\pm$ 2	CUTKOSKY	80 IPWA	$\pi N \rightarrow \pi N$	
4 $\pm$ 2	HOEHLER	79 IPWA	$\pi N \rightarrow \pi N$	
••• We do not use the following data for averages, fits, limits, etc. •••				
2 $\pm$ 1	SHRESTHA	12A DPWA	Multichannel	
22 $\pm$ 11	VRANA	00 DPWA	Multichannel	
6 $\pm$ 2	MANLEY	92 IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$	

NODE=B017R1  
 NODE=B017R1

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow N\eta</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_2)^{1/2}/\Gamma</math></u>
-0.043	BAKER	79 DPWA	$\pi^- p \rightarrow n\eta$	

NODE=B017R2  
 NODE=B017R2

<u><math>\Gamma(N\eta)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>\Gamma_2/\Gamma</math></u>
0 $\pm$ 1	VRANA	00 DPWA	Multichannel	

NODE=B017R8  
 NODE=B017R8

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow \Lambda K</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_3)^{1/2}/\Gamma</math></u>
+0.01	BELL	83 DPWA	$\pi^- p \rightarrow \Lambda K^0$	
not seen	SAXON	80 DPWA	$\pi^- p \rightarrow \Lambda K^0$	
-0.021 $\pm$ 0.033	DEVENISH	74B	Fixed- $t$ dispersion rel.	
••• We do not use the following data for averages, fits, limits, etc. •••				
-0.010 $\pm$ 0.003	SHRESTHA	12A DPWA	Multichannel	

NODE=B017R3  
 NODE=B017R3

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow \Sigma K</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_4)^{1/2}/\Gamma</math></u>
0.010 to 0.023	<sup>1</sup> DEANS	75 DPWA	$\pi N \rightarrow \Sigma K$	
0.06	LANGBEIN	73 IPWA	$\pi N \rightarrow \Sigma K$ (sol. 1)	

NODE=B017R4  
 NODE=B017R4

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow N\pi\pi</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_5)^{1/2}/\Gamma</math></u>
not seen	LONGACRE	75 IPWA	$\pi N \rightarrow N\pi\pi$	

NODE=B017R5  
 NODE=B017R5

**N(1990) PHOTON DECAY AMPLITUDES**

NODE=B017235

Papers on  $\gamma N$  amplitudes predating 1981 may be found in our 2006 edition, Journal of Physics, G **33** 1 (2006).

NODE=B017235

**N(1990)  $\rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

NODE=B017A1  
 NODE=B017A1

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.042 $\pm$ 0.014	<sup>2</sup> ANISOVICH	12A DPWA	Phase = (-30 $\pm$ 20) $^\circ$
0.030 $\pm$ 0.029	AWAJI	81 DPWA	$\gamma N \rightarrow \pi N$
••• We do not use the following data for averages, fits, limits, etc. •••			
0.040	BARBOUR	78 DPWA	$\gamma N \rightarrow \pi N$

**$N(1990) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

VALUE (GeV <sup>-1/2</sup> )	DOCUMENT ID	TECN	COMMENT
0.058±0.012	<sup>2</sup> ANISOVICH	12A	DPWA Phase = (-35 ± 25)°
0.086±0.060	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
••• We do not use the following data for averages, fits, limits, etc. •••			
+0.004	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

NODE=B017A2  
 NODE=B017A2

 **$N(1990) \rightarrow n\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

VALUE (GeV <sup>-1/2</sup> )	DOCUMENT ID	TECN	COMMENT
-0.001	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
••• We do not use the following data for averages, fits, limits, etc. •••			
-0.069	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

NODE=B017A3  
 NODE=B017A3

 **$N(1990) \rightarrow n\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

VALUE (GeV <sup>-1/2</sup> )	DOCUMENT ID	TECN	COMMENT
-0.178	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
••• We do not use the following data for averages, fits, limits, etc. •••			
-0.072	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

NODE=B017A4  
 NODE=B017A4

 **$N(1990)$  FOOTNOTES**

<sup>1</sup> The range given for DEANS 75 is from the four best solutions.

<sup>2</sup> This ANISOVICH 12A value is the complex helicity amplitude at the pole position.

NODE=B017

NODE=B017;LINKAGE=A

NODE=B017A1;LINKAGE=AN

 **$N(1990)$  REFERENCES**

For early references, see Physics Letters **111B** 1 (1982).

NODE=B017

NODE=B017

ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)	REFID=54041
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)	REFID=54862
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)	REFID=51535
PDG	06	JPG 33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)	REFID=51004
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman,, T.-S.H. Lee	(PITT+)	REFID=47593
MANLEY	92	PR D45 4002	D.M. Manley, E.M. Saleski	(KSA) IJP	REFID=41535
Also		PR D30 904	D.M. Manley <i>et al.</i>	(VPI)	REFID=30071
ARNDT	91	PR D43 2131	R.A. Arndt <i>et al.</i>	(VPI, TELE) IJP	REFID=41467
BELL	83	NP B222 389	K.W. Bell <i>et al.</i>	(RL) IJP	REFID=30409
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HEL, CIT, CERN)	REFID=41167
AWAJI	81	Bonn Conf. 352	N. Awaji, R. Kajikawa	(NAGO)	REFID=30067
Also		NP B197 365	K. Fujii <i>et al.</i>	(NAGO)	REFID=30068
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP	REFID=30064
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP	REFID=40096
SAXON	80	NP B162 522	D.H. Saxon <i>et al.</i>	(RHEL, BRIS) IJP	REFID=30404
BAKER	79	NP B156 93	R.D. Baker <i>et al.</i>	(RHEL) IJP	REFID=30056
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP	REFID=30058
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP	REFID=30859
BARBOUR	78	NP B141 253	I.M. Barbour, R.L. Crawford, N.H. Parsons	(GLAS)	REFID=30053
DEANS	75	NP B96 90	S.R. Deans <i>et al.</i>	(SFLA, ALAH) IJP	REFID=30383
LONGACRE	75	PL 55B 415	R.S. Longacre <i>et al.</i>	(LBL, SLAC) IJP	REFID=30047
DEVENISH	74B	NP B81 330	R.C.E. Devenish, C.D. Froggatt, B.R. Martin	(DESY+)	REFID=30036
LANGBEIN	73	NP B53 251	W. Langbein, F. Wagner	(MUNI) IJP	REFID=30368